A targeted neuroglial reporter line generated by homologous recombination in human embryonic stem cells.

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Authors: Haipeng Xue, Sen Wu, Sophia T Papadeas, Steve Spusta, Anna Maria Swistowska, Chad C MacArthur, Mark P Mattson, Nicholas J Maragakis, Mario R Capecchi, Mahendra S Rao, Xianmin Zeng, Ying Liu

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Public Summary:

Scientific Abstract:
In this study, we targeted Olig2, a basic helix-loop-helix transcription factor that plays an important role in motoneuron and oligodendrocyte development, in human embryonic stem cell (hESC) line BG01 by homologous recombination. One allele of Olig2 locus was replaced by a green fluorescent protein (GFP) cassette with a targeting efficiency of 5.7%. Targeted clone R-Olig2 (like the other clones) retained pluripotency, typical hESC morphology, and a normal parental karyotype 46,XY. Most importantly, GFP expression recapitulated endogenous Olig2 expression when R-Olig2 was induced by sonic hedgehog and retinoic acid, and GFP-positive cells could be purified by fluorescence-activated cell sorting. Consistent with previous reports on rodents, early GFP-expressing cells appeared biased to a neuronal fate, whereas late GFP-expressing cells appeared biased to an oligodendrocytic fate. This was corroborated by myoblast coculture, transplantation into the rat spinal cords, and whole genome expression profiling. The present work reports an hESC reporter line generated by homologous recombination targeting a neural lineage-specific gene, which can be differentiated and sorted to obtain pure neural progenitor populations.